

Answers to Michael Muskulus' review

The referee is thanked for the review. Answers and actions to all points are given below (blue text).

1.

The frequency domain method is used with phases included here, which is somewhat unusual - but of course nothing wrong with this. It just means that the method is equivalent to time domain calculations. Computationally, there is not much to be gained here, since for this decoupled analysis the use of an impulse-response-function (as by Schafhirt et al.) can be evaluated with the FFT as well. The observation (p2, l1) that the use of impulse-response-functions needs the manufacturer to share confidential information is not accurate. The only information that is needed is a number of impulse-response-functions, which is similar to the situation in QuLA, where also some information about the support structure, e.g., a mode shape is needed. This should be corrected in the text. I would also suggest to mention already in the abstract that the frequency domain "with phases" is used, for the benefit of readers.

We apologies for the misunderstanding regarding the response functions. The line *"However, this method still require that the wind turbine manufacture share information about their wind turbines, which is difficult to ensure."* is deleted. We have added to line XX that the work of Shafhirt et al concerns rotor loads:

"Recently Schafhirt et al. (2015) combined a sub structuring technique, which is based on the principle of superposition of impulse responses, with the power of modern general purpose graphics processing units to compute the response of an offshore wind turbine subject to rotor loads."

It is added in the abstract that phases are included in frequency-domain:

"The dynamic structural response is represented by the first global fore-aft mode only and is computed in the frequency domain with phases using the equation of motion."

2.

p6, l14: I assume that the reason why the wave kinematics are transformed to the time domain are the nonlinearities in the hydrodynamic force calculation? (Otherwise one could solve the equation of motion directly in the frequency domain) This could be mentioned here explicitly.

The sentence on page 6 line 15-16 is changed:

"The linear irregular wave kinematics and loads are calculated in the frequency domain and afterwards transformed to the time domain using inverse Fast Fourier transformation in order to include the nonlinear terms in the hydrodynamic force."

3.

Small textual corrections

p11, l8: "is calculated alternatively in Flex5"?

p13, l13: "see Fig. 7, lower plot, "?"

p16, l2: "rated rotor speed"?

p18, l12: "decay tests results in the best agreement"?

p21, l10: "to the moment"?

p21, l17f: "are part of the exceedance"?

p22, l9: "which the spectra are based on."?

This is corrected.

Answers to anonymous review

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Page 4

z	Vertical coordinate
λ	Constant i eq. (1) ? shear exponent
α	Generalized coordinate for the power law ?

Changed. Below equation (1) the following is now added:

"Usually the shear exponent is designated as α , but since α in this paper represent the generalized coordinate, the shear exponent is instead designated as λ .

please add the units, s, kN, $\frac{N}{mm^2}$

Units are added to symbol-list

Page 18

① what does increase down through mean? ¹⁸

The sentence is changed to "increases from the top of the monopile and down to the bottom."

Page 19

② the underestimation of the load by QuLA ¹⁹ can be compensated somehow? To make sure the design loads are appropriate.

Yes, it could be compensated by including an extra mode in QuLA. This is explained in line 25-27 on page 28:

"The main part of the modal energy of the second natural frequency is distributed in the Mono Bucket, which explains why the difference between the two models at the second natural frequency is largest at the sea bed

and why the ratio of the equivalent forces in figures \ref{fig:FLS12Decay}-\ref{fig:FLS12Standard} decreases throughout the Mono Bucket.”

The following lines is added:

“This difference could be reduced by including a second degree of freedom in QuLA, as was done by Smilden etal (2016). However, this will also double the complexity of the model, and focus has been to develop a very simple and fast model.”